

4.0.3 AVOIDING EXCHANGE OF SAMPLE WITH ATMOSPHERIC GASES

Collection of environmental samples from water bodies for which concentrations of dissolved gases differ significantly from atmospheric concentrations might require special field equipment or procedures. Water bodies isolated from the atmosphere or with dissolved-oxygen concentrations substantially less than that of air can be found in surface-water systems but are more common in ground-water systems. For such sites, exposure of the sample to the atmosphere can increase dissolved-oxygen concentrations, causing reduced metal ions to oxidize and precipitate as a hydroxide (for example, oxidation of iron species from ferrous (Fe^{+2}) to ferric (Fe^{+3}) iron). Precipitation of the iron or other metal hydroxide before or during filtration results in lower concentrations of iron and co-precipitating metals in the analyzed sample than are ambient in the ground water. Examples of nonmetal analytes for which atmospheric exposure can compromise sample integrity include volatile organic compounds (VOCs), pH, alkalinity, chlorofluorocarbons (CFCs), and some bacteria. Equipment and procedures should be selected that minimize contact with the atmosphere or minimize the effect of pressure changes from the source of the sample to the point of field measurement or sample processing. **In general, to maintain sample integrity for environments of limited atmospheric circulation:**

- ▶ Use pump and tubing conveyances that minimize entrainment of atmospheric gases or use equipment designed to collect and contain sample in situ.
- ▶ Use inline flowthrough sample-collection and sample-processing systems (NFM 6.2.2).
- ▶ Transport samples that need to be processed at the surface inline to a chamber filled with an inert gas such as nitrogen. This prevents oxidation but does not prevent degassing.